

Attorney for GEOCommand, Inc.

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## SUMMARY

Following the FCC's adoption of rules for the establishment of a mandatory public/private partnership between the D Block Licensee and the Public Safety Broadband Licensee (the "700 MHz Public/Private Partnership"), Auction 73 failed to elicit a bid equal to or in excess of the reserve price. To best ensure the success of the long-awaited nationwide broadband 700 MHz public safety network, the FCC is revisiting the rules governing the D Block spectrum in the 700 MHz band. GEOCommand believes that incorporation of, and reliance upon, other frequency networks can increase the spectrum and cost efficiency of the contemplated 700 MHz broadband public safety network, improve the business model for the 700 MHz Public/Private Partnership, and enhance the quality, delivery and speed of public safety services.

The technology exists now for public safety services to be provided initially over other frequency networks and then linked to the 700 MHz broadband public safety network as needed, once that network is up and operating. The key is for the other networks either to operate with a common IP base (characteristic of most modern networks), or to incorporate products (such as the GEOCommand Dynamic Server) which is capable of translating data from a legacy network to the 700 MHz broadband network in seamless manner.

It also is more cost effective to utilize other networks for certain public safety services as a supplement to the nationwide 700 MHz network. The more narrowband frequency bands -- such as 220 MHz -- have superior propagation and coverage. As a result, the antenna and base stations for a narrowband network are more spaced out (and less expensive) than in a 700 MHz network.

Moreover, it is more spectrum efficient to deploy certain public safety services in more suitable narrowband frequency networks. Short message applications, such as AVL and sensor data, for example, can be deployed over a narrowband network and must be “always on” to be effective. If these services are provided over the broadband 700 MHz network, the licensee has less flexibility to manage the network and must divert other uses of the network to permit the “always on” services to proceed with continuous monitoring. This result, quite simply, is not spectrum efficient, particularly when commercial access to the 700 MHz network is contemplated in the absence of “emergencies.”

In order to derive the benefits from utilizing these other networks, the performance and coverage factors associated with such networks should count toward the performance and coverage requirements imposed on the 700 MHz D Block licensee. While precautions may be necessary to ensure that these benefits are not abused, if threshold requirements are adopted and eligibility criteria defined, the D Block licensee would have the proper incentives to make use of these other networks without undermining the ultimate success of the nationwide 700 MHz broadband public safety network.

**Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
	)	
Service Rules for the 698-746, 747-762	)	WT Docket No. 06-150
And 777-792 MHz Band	)	
	)	
Implementing a Nationwide, Broadband	)	PS Docket No. 06-229
Interoperable Public Safety Network in	)	
the 700 MHz Band	)	
	)	

To: The Commission

**Comments of GEOCommand, Inc.**

GEOCommand, Inc. ("GEOCommand"), by its counsel, hereby submits these comments on the Second Further Notice of Proposed Rulemaking released by the Federal Communications Commission ("FCC" or "Commission") on May 14, 2008.<sup>1</sup>

**I.**

**INTRODUCTION**

The FCC has long pursued a means to facilitate public safety access to a nationwide, interoperable broadband network. In particular, the FCC has envisioned a wide-area network which uses common protocols and reflects cost reductions through economies of scale in acquiring mobile equipment. The contemplated network's structure would provide horizontal intercommunication (e.g., between municipalities) and vertical intercommunication (e.g., among

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<sup>1</sup> Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, Second Further Notice of Proposed Rulemaking, ("Second Further NPRM").

municipalities, states and federal entities). In addition, such a network would allow emergency responders to cross jurisdictional boundaries without losing voice and data capabilities.

**A. The Second Further NPRM.**

In furtherance of this goal, in 2007, the FCC adopted rules for the establishment of a mandatory public/private partnership between the D Block Licensee and the Public Safety Broadband Licensee (the “700 MHz Public/Private Partnership”) in the upper portions of the 698-806 MHz band (“700 MHz Band”).<sup>2</sup> The FCC had hoped that adoption of this 700 MHz Public/Private Partnership would promote commercial investment in the build-out of a shared broadband nationwide network infrastructure for both commercial and public safety users. In the recently concluded Auction 73 for commercial 700 MHz licenses, however, bidding for the D Block did not meet the applicable reserve price of \$1.33 billion. As a result, the Second Further NPRM now considers various modifications to its rules with respect to the D Block spectrum.

The comments solicited by the FCC on this matter revisit many of the fundamental principles previously adopted with respect to the D Block spectrum to determine whether there are better means to achieve its goal of a nationwide interoperable broadband public safety network.<sup>3</sup> Although GEOCommand supports the concept of such a partnership as best ensuring the funding and construction of a nationwide broadband public safety network (and has so stated in earlier comments), it will defer to those more directly involved in the 700 MHz Public/Private

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<sup>2</sup> See Second Report and Order, 22 FCC Rcd 15289 (2007) (“Second Report and Order”).

<sup>3</sup> Thus, for example, the Second Further NPRM seeks comment on (i) the nature of the Public Safety Broadband Licensee and entities associated with it; (ii) the technical requirements applicable to the shared wireless broadband network; (iii) the rules governing public safety priority access to the D Block spectrum; (iv) the D Block performance requirements and license term; (v) the respective roles and responsibilities of the D Block Licensee and the Public Safety Broadband Licensee; (vi) the various fees associated with the shared network; (vii) the process for negotiating and establishing the Network Sharing Agreement; and (viii) even whether the FCC should proceed with a 700 MHz Public/Private Partnership at all. See, Second Further NPRM, at para. 3.

Partnership on the fundamental principles governing its creation and operation. Instead, GEOCommand will focus on another area of comment solicited by the FCC in the Second Further NPRM: the extent to which other frequency bands can be utilized to augment and mesh with the contemplated nationwide broadband public safety network so as to (i) maintain interoperable and high quality public safety services; (ii) increase the efficient use of spectrum and resources utilized; (iii) ensure the more timely provision of public safety services; and (iv) improve the business model for the 700 MHz Public/Private Partnership.

The FCC's Second Further NPRM clearly extends to such matters, as reflected by the FCC's request for comments addressing (i) whether some public safety users can be expected to use legacy or new local networks rather than the national public safety broadband network, and if so, what the timing for such use would be; (ii) the extent to which the public safety broadband network will or should be interoperable with existing voice and data networks; (iii) whether there are any particular services or applications that might be better provided by alternative networks; (iv) whether there are any other frequencies available to public safety users more appropriate to certain applications; and (v) whether such other networks could be made interoperable with the public safety broadband network using 700 MHz spectrum.<sup>4</sup>

As will be discussed below, GEOCommand strongly believes that, with the proper technology, public safety services can be provided over other frequencies bands -- such as 220 MHz, 450 MHz, 900 MHz and 2.4 GHz. These other networks can be brought on line *immediately* and link seamlessly to the 700 MHz nationwide public safety network once it is constructed, and then, only as needed. As a result, these other networks would serve to augment the nationwide network and enhance the ability of the 700 MHz Public/Private Partnership to construct and operate an effective nationwide public safety system.

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<sup>4</sup> Second Further NPRM, at paras. 78 & 103.

**B. GEOCommand's Interest In The Second Further NPRM.**

GEOCommand's comments in this proceeding are provided from the perspective of a software solutions company serving the public safety community. GEOCommand's business is focused squarely on first responders and its interest is in promoting plans to enhance the capabilities of these responders in the most efficient and effective manner.

In essence, GEOCommand is an advanced mapping data and information tool. It provides first responders with advanced GIS mobile mapping solutions, making available the timely data needed for critical field decisions.<sup>5</sup> GEOCommand's mobile geographic information system can be integrated with global positioning systems, computer aided dispatch and other mobile computing devices, with the ability to integrate with various communications technologies, including both the internet and wireless.<sup>6</sup> As a result, GEOCommand provides first responders with valuable information to enable them to respond to emergency situations and provide their services in a safe and efficient manner.

Many GIS systems display spatial information in the tabular format of a database, which can be difficult to interpret. GEOCommand's display, by contrast, is visual, with spatial data

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<sup>5</sup> GEOCommand provides its equipment and software for various first responders, including in particular, fire companies, police departments, utility companies, airports, nuclear facilities, emergency medical units, and bridge and tunnel authorities and at all levels of government. The GEOCommand software has been used by the Los Alamos National Lab the City of Roseville, CA Fire Department and The City of Worcester, Mass. Fire Department, the Cortez CO Fire Protection District and Bridgewater VA Volunteer FD. Worcester is evaluating a preliminary release of the new revision and is scheduled to be a pilot participant in the spring including a complete GEOCommand Interoperable Data Communications system with the live transmission of AVL, weather, chemical and radiation sensor data on the GEOCommand Mobile Module within the responder's vehicles. Cortez Fire Protection District has filed for a grant and anticipates funding in mid-September 2008 to purchase the complete GEOCommand Interoperable Data Communications system.

<sup>6</sup> A geographic information system, or GIS, is a computer application that can capture, store, analyze, and display geographically referenced information. Most emergency-related information contains a location reference, placing the information at some point on the globe. The power of a GIS comes from its ability to link, or integrate, pieces of information that are difficult to associate in any other way. For example, a GIS can combine information from different sources – maps, pre-plans, hydrant records, land records, and aerial photography – to display a road map that includes building information, water sources, topography, and visual images of the area surrounding an emergency. A GIS can analyze this information to provide visual data that includes driving directions, fall-back zones, and hazmat warnings.



viewed in layers that combine to form an immediately understandable model of the real world.

GEOCommand's first layer consists of visible geography: building footprints, pavement edges, bodies of water, and land formations. This information can be superimposed on an aerial photographic background. Second and third layers display the invisible geography: utilities, zoning, parcels, and special districts (fire, police, school, historic, voting, etc.).<sup>7</sup>

GEOCommand's solution is operationally compatible with multiple frequency bands in the first instance. Evidencing this compatibility, GEOCommand last year demonstrated its technology at the Center for Domestic Preparedness, Department of Homeland Security, located in Anniston Alabama, showing operational capability at 220 MHz, 450 MHz, 900 MHz and 2.4 GHz. In addition, GEOCommand technology can ensure wireless connectivity capabilities between and among several frequency bands currently in use and contemplated for future use by public safety and homeland security agencies. One component in particular ensures this interoperability: the GEOCommand Dynamic Server. This component brokers real-time information from, for example, weather stations and fixed or mobile sensors, and importantly, acts as a bridge to convert the data stream from whatever frequency band it is on to any other frequency band -- such as the 700 MHz band.

GEOCommand recently expanded its model to include infrastructure components by acquiring a significant equity interest in CX2 Technologies, the only company in the world to have developed a narrowband wireless data solution at 220 MHz.<sup>8</sup> This solution provides

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<sup>7</sup> GEOCommand was developed to leverage existing GIS data sets that are freely available across the nation. Common map data maintained by local governments includes building footprints, aerial photography, and utility network data. This currently available map data instantly provides responders with a detailed graphic representation of an incident site. The responder can select an individual map feature for more information. For example, clicking a hydrant on the map displays the hydrants status and flow rate, critical information at the scene of a fire.

<sup>8</sup> In addition to its equity interest in CX2 Technologies, GEOCommand also provides consulting services to CX2 on the ways in which its infrastructure can best be utilized.

spectrum efficiency, extraordinary coverage footprint, readily dedicated public safety spectrum, and generally interference free operation. The 5 KHz bandwidth in 220 MHz, while not suited to transferring large data packets, nevertheless is extremely well suited for dispatch, vehicle location, remote sensor monitoring, and other short message applications -- all critical services in the public safety environment.

Based on its businesses, products, and interaction with the public safety industry, GEOCommand can comment with authority on the feasibility of using various other frequency networks in conjunction with the contemplated broadband 700 MHz public safety network.

## II.

### DISCUSSION

In the Second Report and Order, the FCC made a serious effort to fashion a comprehensive plan to implement a 700 MHz nationwide broadband network. Spectrum drawn from the 700 MHz band is well-suited for this task from a technical perspective. Its propagation characteristics ensures broad coverage from a single transmitter. Certain public safety services, however, are better provided over other frequency networks, which can then be linked to the 700 MHz network when necessary. The use of these other networks only enhances the contemplated broadband public safety network, increasing the flexibility for its use and development.

#### **A. The Technology Exists For Certain Public Safety Services To Be Efficiently Provided Over Other Frequency Networks And Meshed With the Nationwide Broadband Network As It Comes On Line.**

The FCC has focused on a national broadband network capable of fully interoperable services, including the ability to obtain location and status information of personnel and equipment in the field. As a practical matter, however, it will be some time before such a

network is a reality.<sup>9</sup> Fortunately, there are several services that are more appropriately provided on other networks, *so long as they are fully interoperable with the nationwide broadband network once it comes on line.*

The key, of course, is to assure that services provided over other networks can be linked to the 700 MHz network easily and efficiently. Most modern networks, including the contemplated 700 MHz nationwide network, have (or will have) a common IP-based network, using a TCP/IP protocol. This modern day network backbone reflects a standard internet format, thereby ensuring that data on other networks also using this common IP base can communicate with complete interoperability. Some other networks already utilize this common protocol, thus permitting transparent interoperability. The 220 MHz network contemplated by CX2 Technologies (of which GEOCommand is now a significant shareholder), for example, utilizes a modern IP-based network, and would have immediate and complete interoperability with the contemplated 700 MHz broadband public safety network, whenever it comes on line.

To the extent that services are provided over legacy networks that do not utilize a common IP-based network, GEOCommand's Dynamic Server is capable of converting the data from the old network -- at any frequency band -- and meshing it into a modern network, such as the contemplated 700 MHz broadband public safety network. This capability opens up all sorts of possibilities for supplementing the 700 MHz network and creating additional flexibility for the commercial and public safety operators.

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<sup>9</sup> The re-auction of the D Block has yet to occur, with a likely target date at the very end of the year at the absolute earliest (with a re-auction during the first quarter of 2009 year more likely). Once the auction winner is selected (assuming that a 700 MHz Public/Private Partnership is still in place), a Network Sharing Agreement will have to be negotiated between the D Block licensee and the Public Safety Broadband Licensee. Following the completion of this agreement, the network itself would have to be built out. Based on these conditions, it is extremely unlikely that the contemplated 700 MHz broadband network would be fully built out for several years at the very least.

Those services most conducive to being provided over other networks involve short message data applications, including automatic vehicle location (AVL) and sensor detection (e.g., biological, chemical nuclear, fire, smoke). Not only can these services be provided over much more narrowband spectrum, such as 220 MHz, but they can be monitored on a continuous basis -- i.e., be "always on," without involving the 700 MHz network until an incident occurs. Offloading these sorts of services to other networks that either exist now or can be constructed immediately,<sup>10</sup> would ensure the availability of these services far more quickly than waiting for all services to be provided over the as yet unlicensed and unbuilt 700 MHz broadband network.

**B. Incorporating Other Frequency Networks Into The Plan For A Nationwide Public Safety Service Network Would Be Significantly More Cost Effective.**

The costs associated with constructing the contemplated nationwide interoperable broadband public safety network are likely to be considerable. By its very nature, public safety systems have special requirements. The proposed network must reach into all areas of the country, including rural communities which are generally considered to be high cost, low density areas. The sites needed for the proposed network will likely number into the tens of thousands. Further, public safety agencies require their communications systems to be built to significantly higher standards of reliability and redundancy than are the norm in commercial networks. Ongoing operational/maintenance and upgrade costs to ensure that the network remained state-of-the-art also would require a continuing financial commitment by the commercial operators.

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<sup>10</sup> Importantly, ample unencumbered spectrum is available in the 220 MHz band. A total of 2 MHz of spectrum was allocated to the 220 MHz services band -- constituting a true "narrowband" allocation. The 220 MHz spectrum is divided into 200 channel pairs, each channel's center frequency is spaced 5 KHz apart, with "mobile side" frequencies 1 MHz higher than the corresponding "base side" frequencies. Ten channel pairs are available exclusively for Government operations and 15 channel pairs are available exclusively for Public Safety, with a total of 175 channel pairs available for use by commercial, business, or other eligible entities. Many of these frequencies are currently not being fully utilized. See 47 C.F.R. §§ 90.20(a); 90.703; 90.717; 90.720.

The utilization of other frequency bands -- particularly frequencies in lower bands with a narrower bandwidth -- to augment the contemplated nationwide broadband network incorporates significant cost savings into the business model for the nationwide network. One reason for this is the superior propagation characteristics associated with frequencies in lower bands. Another reason is the significant difference in signal strength between frequency bands of different bandwidth. All other things being equal, a 5 KHz bandwidth gives *200 times* (23 dB) the signal to noise performance of a 1 MHz bandwidth. As a result, these two characteristics -- frequency and bandwidth -- combine to yield a greatly increased coverage footprint for a given transmitter location and output power.

The cost consequences associated with this difference in coverage and propagation are obvious. In 700 MHz, the antennas and base stations must be closer together to ensure continuous coverage. The more antennas and base stations that are needed, the more expensive the network. A 220 MHz network, by contrast, would require far less antennas and base stations at a significantly lower cost, while providing greater coverage and superior propagation.

Moreover, this difference in signal strength and coverage ensures that the more narrowband system can extend more easily into low-density, high-cost rural areas. To the extent that the commercial 700 MHz operator is required to extend the 700 MHz network to these high cost areas either by public safety or by the FCC, such an endeavor will almost certainly be extremely expensive for the operator.<sup>11</sup> The cost savings associated with the use of, and incorporation of, other more narrowband networks -- particularly in low-density, high-cost

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<sup>11</sup> It should be noted that commercial operators would not likely build out into rural areas without being required to by public safety. In fact, CTIA indicated as much in the testimony of its president before the Senate Committee on Commerce, Science & Transportation in a hearing on Current and Future Public Safety Communications on February 8, 2007.

rural areas -- should ensure that these other networks become an integral part of the planning for a nationwide public safety network.

**C. Utilizing Other Frequency Networks For Certain Public Safety Services Is More Spectrum Efficient.**

In addition to the likely cost savings associated with using other frequency networks to supplement the contemplated nationwide broadband network, greater spectrum efficiency will ensue as well. The FCC has historically touted spectrum efficiency as a worthy public policy goal, and has adopted rules in various services intended to encourage greater efficiencies in spectrum use.<sup>12</sup> In the 220 MHz Service, for example, the FCC expressly required narrowband technologies to be utilized as a potentially more efficient use of spectrum.<sup>13</sup>

A national 700 MHz broadband public safety network, such as that contemplated by the FCC in this proceeding, is particularly well suited to those services not accommodated by frequencies with narrower bands, such as video. Short message applications, on the other hand (such as AVL and sensor detection) require far less bandwidth and *would constitute a more efficient use of spectrum* if deployed over more narrowband frequencies.

In addition, these services also require that spectrum be reserved for its use at all times, as they must be “always on” for continuous monitoring to be effective.<sup>14</sup> The contemplated 700

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<sup>12</sup> See, e.g., Spectrum Policy Task Force Report, SpecPol-1, ET Docket No. 02-135 (2002); Implementation of Section 309(j) and 337 of the Communications Act of 1934, as amended; Promotion of Spectrum Efficient Technologies on certain Part 90 Frequencies, Second Report and Order and Second Further Notice of Proposed Rulemaking; ET Docket 99-87, RM-9332, 18 FCC Rcd 3034 (2003).

<sup>13</sup> See Report and Order, Gen Docket No. 87-14, 3 FCC Rcd 5298 (1988), recon. denied, 4 FCC Rcd 6417 (1989) (“220 MHz Allocation Order”), in which the FCC noted that spectrum efficient technologies would be essential in meeting this country’s future land mobile requirements. 3 FCC Rcd 5298, at para. 17. See also, Amendment of Part 90 of the Commission’s Rules to Provide for the Use of the 220-222 MHz Band By the Private Land Mobile Radio Services, 4 FCC Rcd 8593 (1989).

<sup>14</sup> A sensor detection network would be of little use, for example, if it was activated only in the event of an emergency. It may well be the sensor network that alerts the public safety community to the fact that an emergency exists. These sensors must be “always on,” therefore, in order to be effective.

MHz broadband public safety network is based on the premise that public safety uses the frequencies “when needed,” i.e., when emergencies occur. Because these frequencies are supposed to be available for commercial use when they are not needed by public safety, it is simply spectrally inefficient to use the 700 MHz broadband network for the transmission of “always on” short message information, in which critical monitoring functions are being performed on a continuous basis.<sup>15</sup> By offloading these services to a more appropriate frequency band, such as 220 MHz, the 700 MHz Public/Private Partnership gains flexibility to better manage the 700 MHz broadband network for services better suited for it. To the extent that an emergency occurs, the information from the 220 MHz networks can be linked to the 700 MHz broadband network in a seamless manner.<sup>16</sup>

**D. As Integral Components Of The Nationwide Strategy, These Other Networks Should Contribute Towards The Coverage And Performance Requirements Imposed on The Nationwide Network.**

The fact that no D-Block bid meeting the reserve price was received in the recently concluded 700 MHz auction has prompted the FCC to consider whether the contemplated public/private partnership business model is viable. In searching for ways to make the model more attractive, the FCC has asked whether the incorporation of other networks into the 700 MHz broadband network should permit the 700 MHz Public/Private Partnership to count these other networks toward various construction and other performance requirements.<sup>17</sup>

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<sup>15</sup> It should be noted that the short message applications do not, in themselves, consume extensive spectrum in the broadband 700 MHz network. However, because these applications are “always on” and easily transmitted over narrowband services, it is an inefficient use of broadband spectrum to provide these services over the 700 MHz network when they could so much more efficiently be deployed over a narrowband network and remain in the “always on” mode without burdening the 700 MHz Public/Private Partnership.

<sup>16</sup> As previously noted, this seamless interoperability is due to the existence of (i) a common IP-based network infrastructure in the case of a more modern other network, or (ii) the GEOCommand Dynamic Server, which can convert the data from an older network to the 700 MHz network.

<sup>17</sup> Second Further NPRM, at para. 103.

GEOCommand believes that these other networks could serve a vital role in the national strategy for modernizing public safety services and could enhance and augment the contemplated 700 MHz network. Accordingly, GEOCommand believes that the use of such other networks should be encouraged and tangible incentives established for such use. One such tangible incentive would permit the coverage and performance factors associated with these networks to count, in some fashion, towards the coverage and performance requirements imposed on the 700 MHz licensee for the D Block.

Certain issues may arise if such tangible incentives are adopted. First, there must be some way to measure the actual use of the other networks by the 700 MHz D Block licensee, and some minimum threshold amount of use required before the incentives would apply. Similarly, there should be some consideration to the extent to which use of the other networks continues (i.e., it should not be enough to qualify for coverage and performance benefits if the other network is only used for a short period of time).

Conversely, there may be some concern about other network use undermining the development and build out of the 700 MHz network. It is important to realize the benefits associated with other network use, particularly when dealing with a nationwide area, which includes low-density high-cost rural areas. The ability to leverage the performance and coverage factors associated with these other networks could significantly improve the business model of the 700 MHz Public/Private Partnership by ensuring a significant cost savings. The FCC must be careful to ensure, however, that reliance on these other performance and coverage factors are not used improperly to avoid construction of portions of the 700 MHz network that it should construct. The proper balance will provide the 700 MHz Public/Private Partnership with necessary flexibility to offset certain build-out and performance requirements based on actual

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reliance and true incorporation of other network operations into the nationwide network. In this regard, it may make sense to qualify the "other network" as serving some itemized purpose, i.e., the network is a narrowband network from which "always on" short message applications are more appropriately deployed.

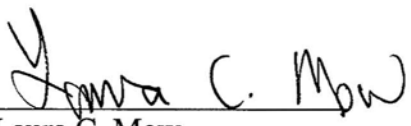
### III.

#### CONCLUSION

GEOCommand appreciates the opportunity to comment upon potential revisions to the FCC's rules governing the D Block licensee in the 700 MHz service. While disappointed that a qualifying bid was not submitted in the recently conducted Auction No. 73, GEOCommand believes that there would be greater commercial interest in the 700 MHz Public/Private Partnership if other networks figured more prominently into the national plan. In particular, FCC rules encouraging the deployment of certain public safety services over other networks, which in turn, are capable of linking with the 700 MHz broadband public safety network as needed, would (i) enhance the business model for the 700 MHz Public/Private Partnership; (ii) improve the efficiency and speed of delivery for public safety services, and (iii) better ensure the construction and operation of a modern, interoperable broadband public safety system.

Respectfully submitted,

**GEOCOMMAND, INC.**

By:   
Laura C. Mow  
Kilpatrick Stockton LLP  
Suite 900, 607 14<sup>th</sup> Street, N.W.  
Washington, D.C. 20005-2018

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Its Attorney